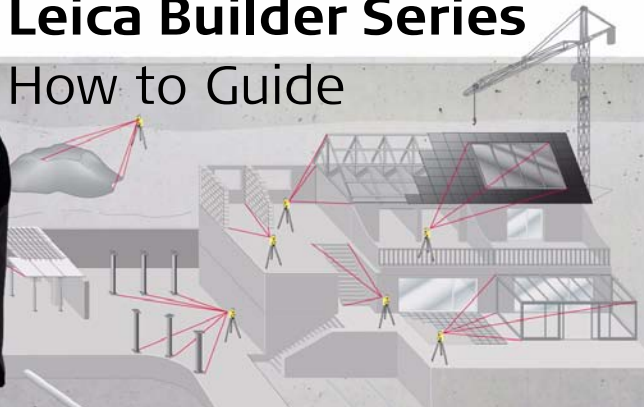




Leica Builder Series

How to Guide



Version 1.0
English

- when it has to be **right**

Leica
Geosystems



To use the product in a permitted manner, please refer to the detailed safety instructions in the User Manual.

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How to Getting Started

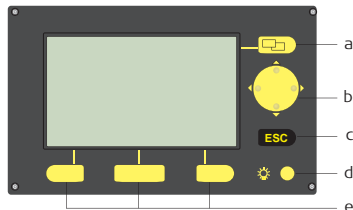


Depending on the Builder model some functions might not be available.

Description of the User Interface

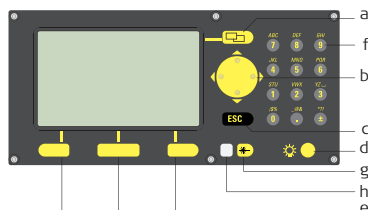
Keyboard

Builder 100, 200 and 300








- a) Page key
- b) Navigation keys
- c) ESC
- d) Light
- e) Function keys

Builder 400 and 500


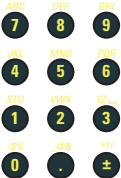



- f) 10-digit keypad
- g) EDM key
- h) LED



Keys for all Builder models:

Key	Description
	Changes tab in the tab bar. Press to switch between the CONFIG , THEO , PROG and DATA tab pages.
	<ul style="list-style-type: none">• Move the focus on the screen.• Start the edit mode for edit fields.• Control the input bar in edit and input mode.
	<ul style="list-style-type: none">• Leaves the current menu or dialog without storing changes made.• If THEO mode is active: press for approximately 5 seconds to access System Info.
	Turns the display light including reticle illumination on and off.
	Correspond to the three softkeys that appear on the bottom of the screen when the screen is activated.

Keys only for Builder 400 and 500:

Key/LED	Description
	<ul style="list-style-type: none"> Press button short: to access the EDM settings. Press button long: to toggle between red dot and prism.
	Alphanumeric keys
	<ul style="list-style-type: none"> LED white: EDM type is prism. LED red: EDM type is red dot. LED flashes once if the EDM setting has changed by toggling or when a measurement is taken. LED blinks if EDM measures in tracking mode.

Sidecover keys

Key	Description
	On / Off key. Switches the instrument on or off.
	Switch key. The top end of the Switch key is Switch Key 1, the lower end is Switch Key 2.

Switch key functionality

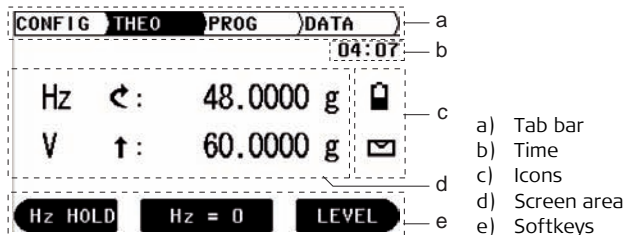
Builder model	Switch key 1	Switch key 2
100 series	Sector beep on/off	-
200 series	Laser pointer on/off	-
300 series	Laser pointer on/off	-
400 series	EDM tracking on/off	Switch between Measure/Record, All in 1 and Measure
500 series	Laser pointer on/off	Switch between Measure/Record, All in 1 and Measure



These settings or modes can also be changed in the **CONFIG** tab page.

Explanation of the Screen

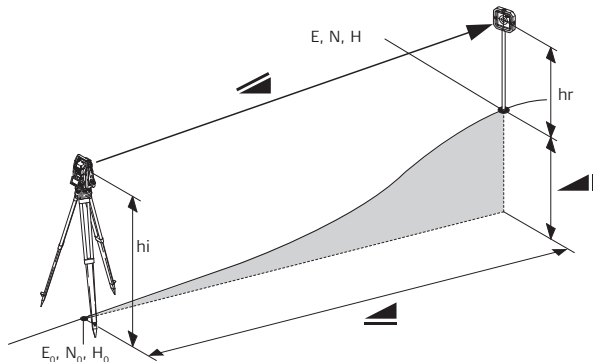
Screen






Element	Description
Tab bar	The current active tab is shown in black.
Time	Shows the current time provided that the setting is made in the configurations.
Icons	Shows the current status information of the instrument.
Screen area	The working area of the screen.
Softkeys	Commands can be executed using the Softkeys. The commands assigned to the softkeys are screen dependent.

Explanation of the Displayed Data

Overview

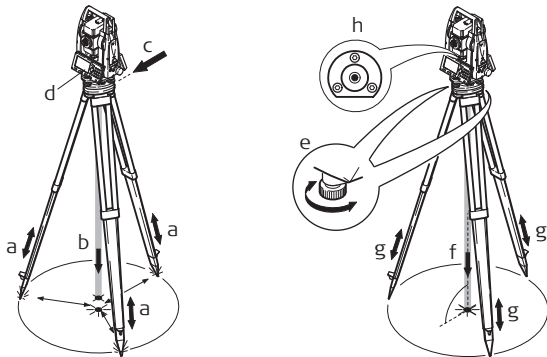



Abbreviation	Description
	Indicated meteorological corrected slope distance between instrument tilting axis and centre of prism/laser dot.
	Indicated meteorological corrected horizontal distance.
	Height difference between station and target point.

Abbreviation	Description
hr	Reflector height above ground.
hi	Instrument height above ground.
E_0	Easting of Station.
N_0	Northing of Station.
H_0	Height of Station.
E	Easting of target point.
N	Northing of target point.
H	Height of target point.

How to Set Up Builder Anywhere or over a Ground Point

Setup step-by-step



1. Extend the tripod legs to allow for a comfortable working posture (a).
2. **Over a ground point:** Position the tripod over the marked ground point, centring it as good as possible (b).
3. Fasten the tribrach and instrument onto the tripod (c).
4. Turn on the instrument by pressing the  key (d).


The electronic level and laser plummet are activated automatically after switching on the instrument, if compensator is set to on.

5. **Over a ground point:** Move the tripod legs (a) and use the tribrach footscrews (e) to centre the plummet over the ground point (f).
 6. Adjust the tripod legs (g) to level the circular level (h).
 7. By using the electronic level turn the tribrach footscrews (e) to precisely level the instrument.
Refer to "How to Level Up Builder" for more information.
 8. **Over a ground point:** Centre the instrument precisely over the ground point (f) by shifting the tribrach on the tripod plate (c).
 9. Repeat steps 7. (and 8.) until the required accuracy is achieved.
-

How to Level Up Builder

Levelling up with the electronic level step-by-step

The electronic level can be used to precisely level the instrument using the footscrews of the tribrach.

1. Turn on the instrument by pressing the  key.

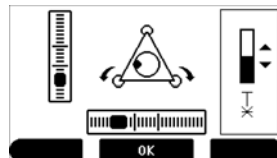
The electronic level and laser plummet are activated automatically after switching on the instrument, if compensator is set to on.

2. Centre the circular level roughly by turning the footscrews of the tribrach.



The bubble of the electronic level and the arrows for the rotating direction of the footscrews only appear if the instrument tilt is inside a certain levelling range.

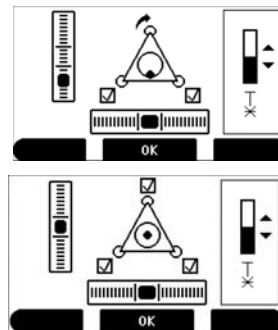
3. Rotate the instrument until it is parallel to two of the footscrews of the tribrach.
4. Centre the electronic level of this axis by turning the two footscrews. Arrows show the direction for rotating the footscrews. When the electronic level is centred the arrows are replaced by checkmarks.



5. Centre the electronic level for the second axis by turning the last footscrew. An arrow shows the direction for rotating the footscrew. When the electronic level is centred, the arrow is replaced by a checkmark.



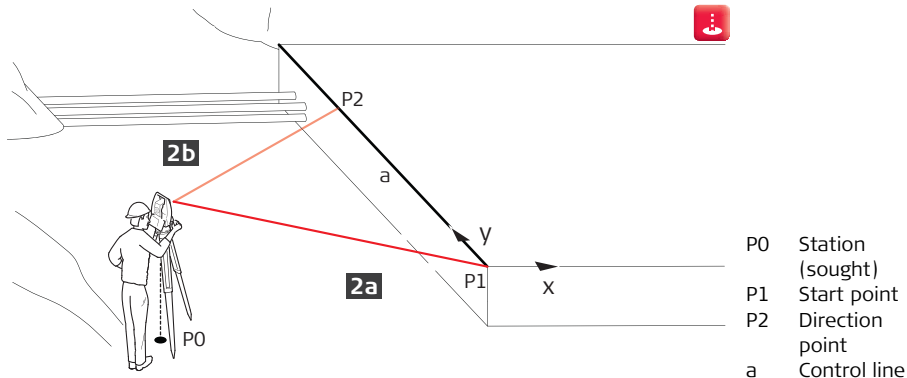
When the electronic level is centred and three checkmarks are shown, the instrument has been perfectly leveled up.



6. Accept with **OK**.
-

1 How to Set Up Builder to Gain a Known Station

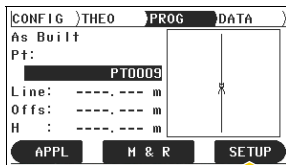
1.1 Set Up Anywhere Based on Given Control Line



Given:

- Start point of control line and one direction point.
- Builder is set up anywhere on site and levelled.

- 1** In the **PROG** Tab page, press **SETUP**. Select **Control Line...** and press **OK**. Select **Anywhere...** and press **OK**.



CONFIG > THEO > PROG > DATA >
As Built
Pt: PT0009
Line: --- m
Offs: --- m
H : --- m
APPL M & R SETUP



CONFIG > THEO > PROG > DATA >
Control Line...
Coordinates...
Height...
OK

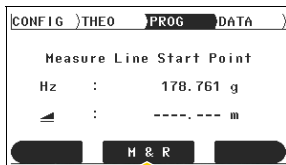


CONFIG > THEO > PROG > DATA >
ESTABLISH CONTROL LINE
Over 1st Point...
Anywhere...
OK

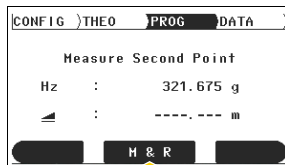


After selecting a programme or setup, you always have to press **OK**. This will from now on no longer be stated but implied.

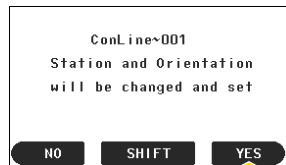
- 2** Sight start point of control line [2a] with the telescope and press **M & R**. Sight direction point [2b] and press **M & R**. Confirm new Station and Orientation with **YES**.



CONFIG > THEO > PROG > DATA >
Measure Line Start Point
Hz : 178.761 g
Δ : --- m
M & R

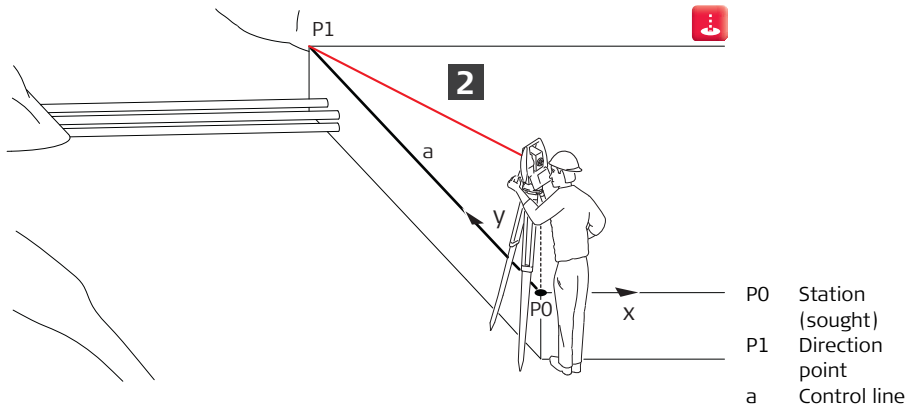


CONFIG > THEO > PROG > DATA >
Measure Second Point
Hz : 321.675 g
Δ : --- m
M & R



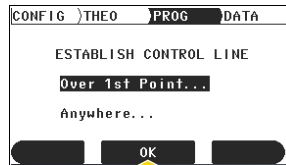
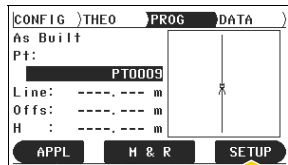
ConLine~001
Station and Orientation
will be changed and set
NO SHIFT YES

1.2 Set Up over Control Line

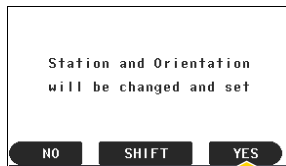
**Given:**

- Start point of control line and one direction point.
- Builder is set up over start point of control line.

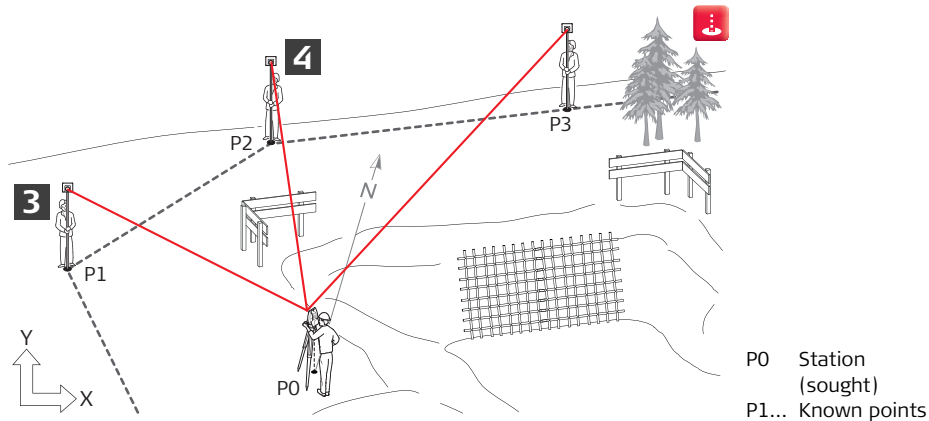
1 In the **PROG** Tab page, press **SETUP**. Select **Control Line...** and **Over 1st point....**



2 Sight direction point and press **OK**. Confirm new Station and Orientation with **YES**.

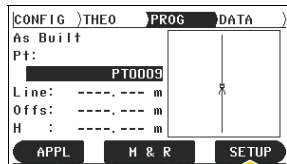


1.3 Set Up Anywhere with Given Coordinates

**Given:**

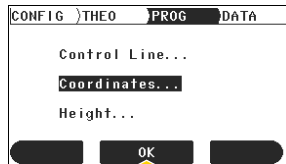
- Two or more points with coordinates have been stored in Builder's memory.
- Builder is set up anywhere on site and levelled.

1 In the **PROG** Tab page, press **SETUP**. Select **Coordinates...** and **Anywhere...**



CONFIG > THEO > **PROG** > DATA >
As Built
Pt: **PT0009**
Line: ----- m
Offs: ----- m
H : ----- m
APPL H & R **SETUP**

A yellow arrow points to the SETUP button.



CONFIG > THEO > **PROG** > DATA >
Control Line...
Coordinates...
Height...
OK

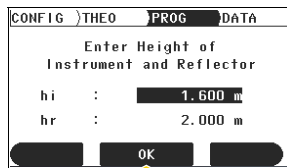
A yellow arrow points to the OK button.



CONFIG > THEO > **PROG** > DATA >
ESTABLISH COORDINATES
Over Known Station...
Anywhere...
OK

A yellow arrow points to the OK button.

2 Enter instrument height (**hi**) and reflector height (**hr**).



CONFIG > THEO > **PROG** > DATA >
Enter Height of
Instrument and Reflector
hi : **1.600 m**
hr : 2.000 m
OK

A yellow arrow points to the OK button.



It is not required to enter a value for hi. It is only needed if you want to know the height of the ground point. If you enter 0.000 m, the telescope height will be shown.

3

Select the first point and sight it. Press **M & R**.

CONFIG	THEO	PROG	DATA
Select First Point			
Pt :	1100 ()		
E :	999.999 m		
N :	1086.831 m		
H :	118.833 m		
<div> <div>P-LIST</div> <div>OK</div> <div>NEW PT</div> </div>			

CONFIG	THEO	PROG	DATA
Measure First Point			
Hz :	321.675 g		
▲ :	----, --- m		
<div> <div></div> <div>M & R</div> <div></div> </div>			

4

Select the second point and sight it. Press **M & R**.


CONFIG	THEO	PROG	DATA
Select Second Point			
Pt :	1103 ()		
E :	999.909 m		
N :	996.281 m		
H :	102.145 m		
<div> <div>P-LIST</div> <div>OK</div> <div>NEW PT</div> </div>			

CONFIG	THEO	PROG	DATA
Measure Second Point			
Hz :	252.848 g		
▲ :	----, --- m		
<div> <div></div> <div>M & R</div> <div>H REFL</div> </div>			


5

Check the results. If they are within the correct deviation, press **YES**. You can measure additional points by pressing **NEXT PT**. Confirm new Station and Orientation with **YES**.

CONFIG	THEO	PROG	DATA
Plausibility Check			
Line Length Given:	90.550 m		
Line Length Meas.:	90.551 m		
Difference	:	-0.001 m	
<input type="button" value="NO"/> <input type="button" value="NEXT PT"/> <input type="button" value="YES"/>			

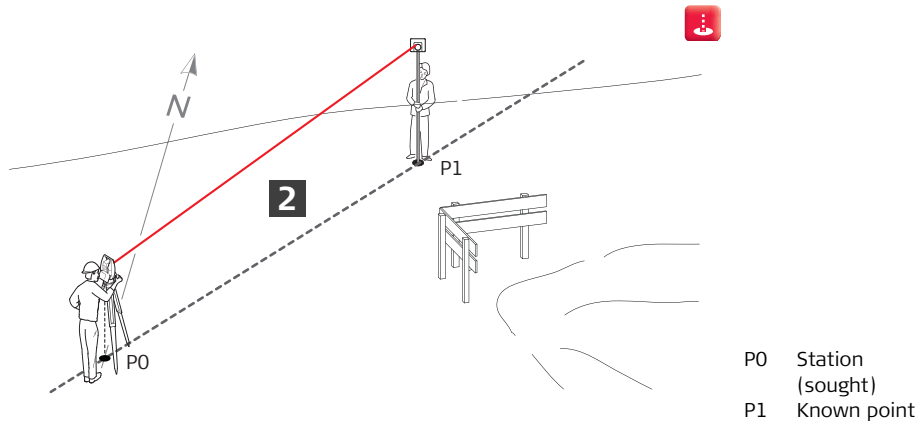


CONFIG	THEO	PROG	DATA
Station and Orientation			
StatAny~002			
will be changed and set			
<input type="button" value="NO"/> <input type="button" value="YES"/>			



If the results are not within the correct deviation, press **NO** and restart at step 1.

1.4 Set Up over One Known Point with Second Known Point

**Given:**

- Two known points with coordinates.
- Builder is set up over one known point and levelled.

- 1** In the **PROG Tab** page, press **SETUP**. Select **Coordinates...** and **Over Known Station...**

CONFIG > THEO > PROG > DATA

As Built

Pt: PT0009

Line: ----- m

Offs: ----- m

H : ----- m

APPL H & R SETUP

CONFIG > THEO > PROG > DATA

Control Line...

Coordinates...

Height...

OK

CONFIG > THEO > PROG > DATA

ESTABLISH COORDINATES

Over Known Station...

Anywhere...

OK

- 2** Enter instrument height (**hi**) and reflector height (**hr**). Select Station Number (**Pt**). Select **Known Backsight Point**.

CONFIG > THEO > PROG > DATA

Enter Height of
Instrument and Reflector

hi : 1.680 m

hr : 1.000 m

DELETE OK

CONFIG > THEO > PROG > DATA

Select Station Number

Pt : 112487

E : 112547.000 m

N : 557853.000 m

H : 258.000 m

P-LIST OK NEW PT

CONFIG > THEO > PROG > DATA

Select Orientation Method

Manual Angle Setting

Known Backsight Point

OK



The known backsight point is the second known point.

3

Select number of backsight point (**Pt**). Sight backsight point and press **OK**. Confirm new Station and Orientation with **YES**.

CONFIG	THEO	PROG	DATA
Select Backsight Point			
Pt :	214116		
E :	357115.000 m		
N :	953599.000 m		
H :	333.000 m		
P-LIST OK NEW PT			

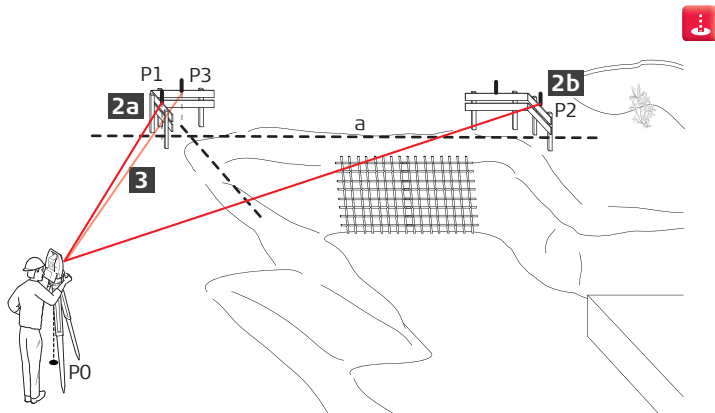
CONFIG	THEO	PROG	DATA
Sight Target Point			
OK			

Station and Orientation will be changed and set		
NO	SHIFT	YES



Only the angle will be measured for the backsight point, not the distance. Therefore it is not necessary to use a target on the point.

1.5 Set Up Using Nails from Profile Boards

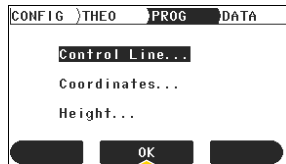
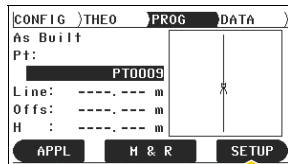


P0	Station (sought)
P1...	Known point
a	Control line

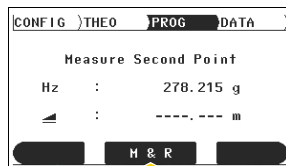
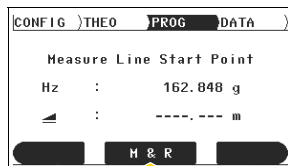
Given:

- Profile boards with nails and plan.
- Builder is set up anywhere on site and levelled.

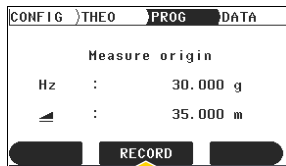
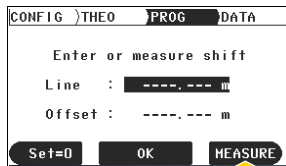
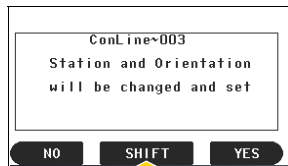
1 In the **PROG** Tab page, press **SETUP**. Select **Control Line...** and **Anywhere...**.



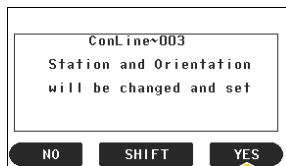
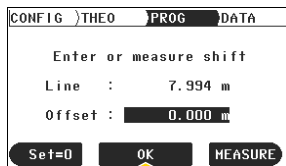
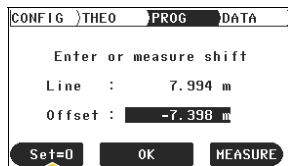
2 Sight one nail of a line as start point and press **M & R** [2a]. Sight the other nail of the line as second point and press **M & R** [2b].



- 3** Press **SHIFT** to move control line in line direction. Press **MEASURE**. Now sight third nail, measure it and press **RECORD**.



- 4** Select **Offset** and press **Set=0**. Press **OK** to confirm it. Confirm new Station and Orientation with **YES**.



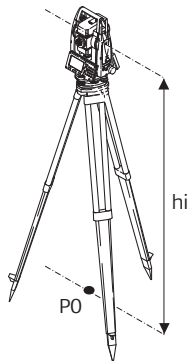


Afterwards, store three or more permanent points outside of the construction site as described in "3.1 Measure a Site Surface" on page 38. In case the profile boards are no longer available, use these points to set up Builder according to "1.3 Set Up Anywhere with Given Coordinates" .

2 How to Set Up Builder with Height



2.1 Transfer Elevation to Builder Placed over Height Benchmark



hi	Instrument height
PO	Benchmark

Given:

Builder is placed over benchmark with given elevation and levelled.

1 In the **PROG** Tab page, press **SETUP**. Select **Height...**

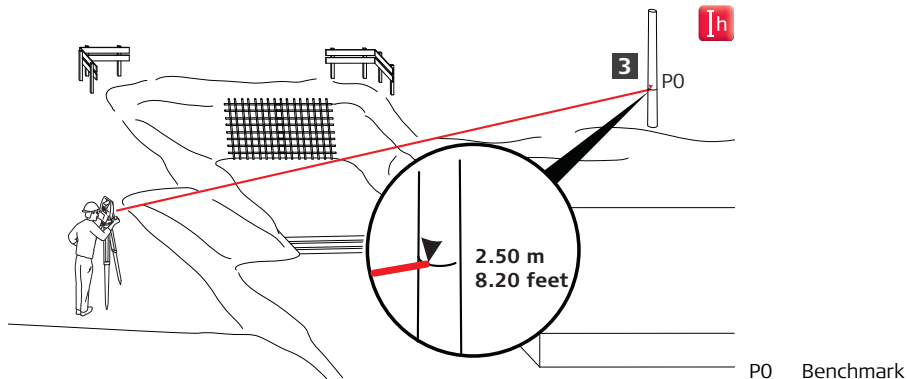
CONFIG > THEO > PROG > DATA >
As Built
Pt: PT0009
Line: ----- m
Offs: ----- m
H : ----- m
APPL H & R SETUP

CONFIG > THEO > PROG > DATA >
Control Line...
Coordinates...
Height...
OK

2 Enter elevation of benchmark (**Station H**), height from benchmark to telescope (**hi**) and reflector height (**hr**). Press **OK** to confirm.

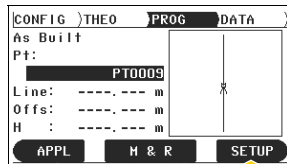
CONFIG > THEO > PROG > DATA >
ESTABLISH HEIGHT
Station H: 230.500 m
hi : 1.400 m
hr : 0.100 m
OK HTRANS

2.2 Transfer Height from Benchmark to Builder

**Given:**

- One benchmark with known elevation.
- Builder is placed anywhere on site and levelled.

1 In the **PROG Tab** page, press **SETUP**. Select **Height....**



CONFIG > THEO > PROG DATA >
As Built
Pt:
Line: ----- m
Offs: ----- m
H : ----- m
APPL H & R **SETUP**

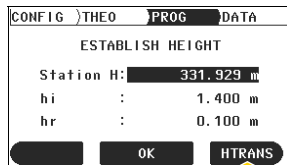
A yellow arrow points to the **SETUP** button.



CONFIG > THEO > PROG DATA >
Control Line...
Coordinates...
Height...
OK

A yellow arrow points to the **OK** button.

2 **Station H** shows the previous station height. Enter instrument height (**hi**) and reflector height (**hr**). Press **HTRANS** for height transfer.



CONFIG > THEO > PROG DATA >
ESTABLISH HEIGHT
Station H:
hi : 1.400 m
hr : 0.100 m
OK **HTRANS**

A yellow arrow points to the **HTRANS** button.



It is not required to enter a value for **hi**. It is only needed if you want to know the height of the ground point. If you enter **0.000 m**, the telescope height will be shown.

- 3** Select benchmark from list (**Pt**) or enter new point. For new point enter elevation of benchmark and press **OK** as shown in centre and right screen.

CONFIG	THEO	PROG	DATA
Select Height Point			
Pt :	112487		
E :	112547.000 m		
N :	557853.000 m		
H :	258.000 m		
<div>P-LIST OK NEW PT</div>			

CONFIG	THEO	PROG	DATA
Enter Point Coordinates			
Pt :	112488		
E :	-----, --- m		
N :	-----, --- m		
H :	-----, --- m		
<div>ENH=0 OK</div>			

CONFIG	THEO	PROG	DATA
Enter Point Coordinates			
Pt :	112488		
E :	112584.210 m		
N :	557831.250 m		
H :	260.000 m		
<div>ENH=0 OK</div>			

- 4** Measure benchmark. Confirm new Station Height with **YES**.

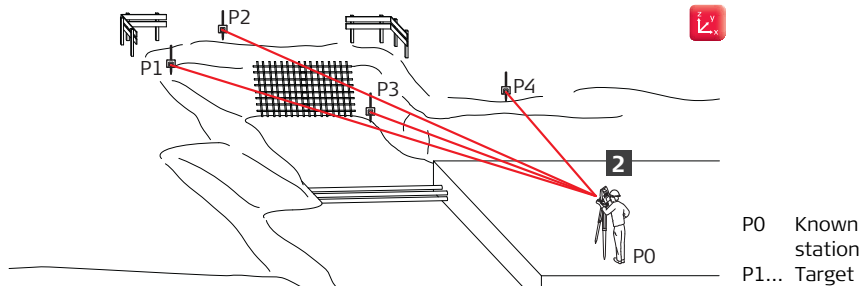
CONFIG	THEO	PROG	DATA
Measure Height Point			
PtId:	112488		
H _z :	278.215 g		
Δ:	----, --- m		
<div>H & R</div>			

CONFIG	THEO	PROG	DATA
New Station Height			
256.488 m			
will be set			
<div>NO NEXT PT YES</div>			

3 How to Measure



3.1 Measure a Site Surface



- You can also do this with application **Measure & Descriptor** or **Angle & Distance**.
- This procedure can also be used, for example, by architects and civil engineers for quantity surveying or by carpenters for receiving exact dimensions for the roof framework.

Given:

Builder is set up with known station and height.

1

In the **PROG** Tab page, press **APPL**. Select **As Built....**

CONFIG > THEO > **PROG** > DATA >

As Built

Pt: PT0009

Line: ----- m

Offs: ----- m

H : ----- m

APPL H & R SETUP

CONFIG > THEO > **PROG** > DATA >

Layout...

As Built...

Angle & Distance...

Tie Distance...

Area...

P-LIST **OK** MORE

2

Enter ID of starting point (**Pt**), sight target and press **MEASURE**. After measuring, press **RECORD** to store the point. Measure and record as many points as needed.

CONFIG > THEO > **PROG** > DATA >

As Built

Pt: PT0001

E : ----- m

N : ----- m

H : ----- m

APPL **MEASURE** SETUP

CONFIG > THEO > **PROG** > DATA >

As Built

Pt: PT0001

E : 1017.461 m

N : 1007.810 m

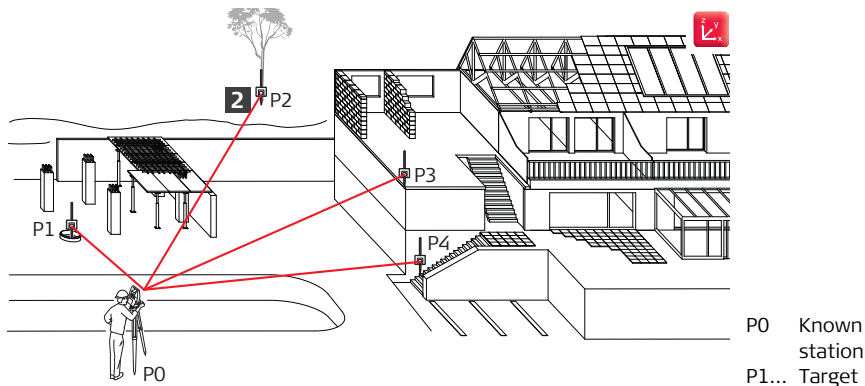
H : 103.445 m

APPL **RECORD** SETUP



- For storing points automatically after measuring, switch to measurement mode **All in 1** by pressing Switch key 2.
- Recorded points can be downloaded to a computer using the CDM software.

3.2 Make a Site Survey with Point Descriptions



This procedure can also be used, for example, by architects and civil engineers for quantity surveying or by carpenters for receiving exact dimensions for the roof framework.

Given:

Builder is set up with known station and height.

1

In the **PROG** Tab page, press **APPL**. Select **Measure & Descriptor....**

CONFIG > THEO > **PROG** > DATA >
 As Built
 Pt: []
 Line: ----- m
 Offs: ----- m
 H : ----- m
 [APPL] [H & R] [SETUP]

CONFIG > THEO > **PROG** > DATA >
 Hidden Point...
 COGO...
 Layout Line/Arc/Spiral...
Measure & Descriptor...
 [P-LIST] [OK] [BACK]

2

Enter ID of starting point (**Pt**), enter a description (**Desc.**) and press **OK**. Sight target and press **MEASURE**. After measuring, press **RECORD** to store the point. Describe, measure and record as many points as needed.

CONFIG > THEO > **PROG** > DATA >
 Measure & Descriptor
 Pt: 1002
 Desc.: ---
 [DELETE] [OK] [ABC1]

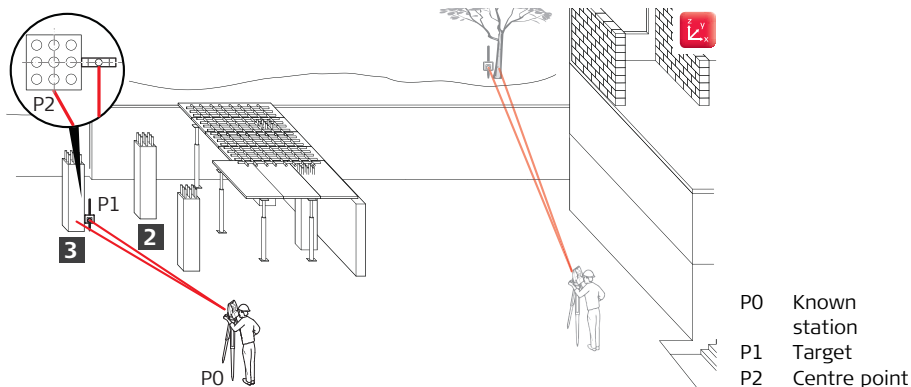
CONFIG > THEO > **PROG** > DATA >
 Measure & Descriptor
 Pt: 1002
 Desc.: TREE
 [APPL] [MEASURE] [SETUP]

CONFIG > THEO > **PROG** > DATA >
 Measure & Descriptor
 Pt: 1002
 Desc.: TREE
 [APPL] [RECORD] [SETUP]



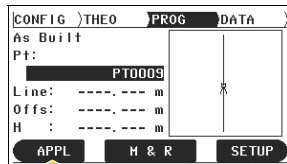
For storing points automatically after measuring, switch to measurement mode **All in 1** by pressing Switch key 2.

3.3 Measure the Centre of Trees or Columns

**Given:**

- Builder is set up with known station.
- Measure and Record mode is set to **Measure/Record**. Refer to "Sidecover keys" on page 8 on how to switch modes.

1 In the **PROG** Tab page, press **APPL**. Select **As Built....**



CONFIG > THEO > PROG > DATA >
As Built
Pt:
PT0009
Line: ---- m
Offs: ---- m
H : ---- m
APPL H & R SETUP

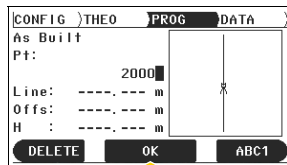
A yellow arrow points to the **APPL** button.



CONFIG > THEO > PROG > DATA >
Layout...
As Built...
Angle & Distance...
Tie Distance...
Area & Volumes...
P-LIST OK MORE

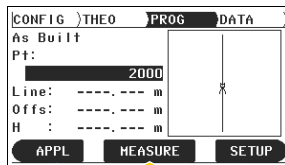
A yellow arrow points to the **OK** button.

2 Place prism next to tree or column in the same distance as the centre. Enter point ID and sight prism. Press **MEASURE**.



CONFIG > THEO > PROG > DATA >
As Built
Pt: 2000
Line: ---- m
Offs: ---- m
H : ---- m
DELETE OK ABC1

A yellow arrow points to the **OK** button.



CONFIG > THEO > PROG > DATA >
As Built
Pt: 2000
Line: ---- m
Offs: ---- m
H : ---- m
APPL MEASURE SETUP

A yellow arrow points to the **MEASURE** button.

3

Before storing the point, turn instrument and sight the centre of the tree or column. Now press **RECORD** to store the point with the new angle.

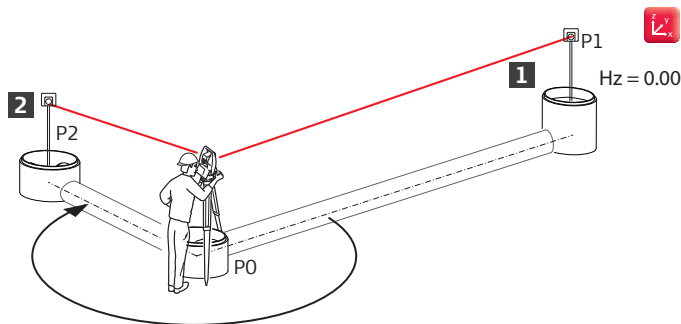
[CONFIG >THEO >PROG >DATA >]	
As Built	
Pt:	2000
Line:	-16.396 m
Offs:	-19.067 m
H :	-0.100 m
[APPL] [RECORD] [SETUP]	

[CONFIG >THEO >PROG >DATA >]	
As Built	
Pt:	2000
Line:	-16.409 m
Offs:	-19.056 m
H :	-0.100 m
[APPL] [RECORD] [SETUP]	



This method of turning the instrument before storing a point works in most of the applications.

3.4 Measure the Angle between Inlet and Outlet of a Planned Concrete Manhole



This procedure can also be used, for example, to check a right angle or to determine the angle for an elbow in power line constructions.

Given:

- Builder is placed over a planned manhole position and levelled.
- The position of the other two manholes is known.

- 1** In the **THEO** Tab page, press **Hz = 0**. Sight the first manhole and confirm new Orientation with **OK**.

CONFIG	THEO	PROG	DATA
04:07			
Hz	↶	138.547 g	🔋
V	↑	100.000 g	✉
<div>Hz HOLD Hz = 0 LEVEL</div>			

CONFIG	THEO	PROG	DATA
Set Hz = 0.000. Orientation will be changed and set			
<div>OK</div>			

CONFIG	THEO	PROG	DATA
04:07			
Hz	↶	0.000 g	🔋
V	↑	100.000 g	✉
<div>Hz HOLD Hz = 0 LEVEL</div>			

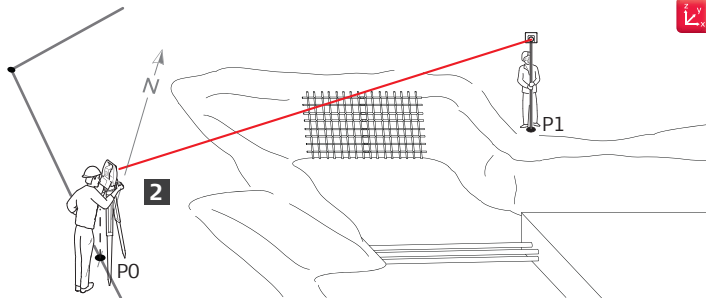
- 2** Sight the second manhole and notice the shown angle (**Hz**).

CONFIG	THEO	PROG	DATA
04:07			
Hz	↶	198.546 g	🔋
V	↑	102.545 g	✉
<div>Hz HOLD Hz = 0 LEVEL</div>			

4 How to Layout



4.1 Layout Points from Memory



P0 Known station
P1 Layout point



This procedure can also be used for all other points you want to layout.

Given:

- Builder is set up with known station. Setup with height is optional.
- List with layout points and coordinates have been stored in Builder's memory.

1 In the **PROG** Tab page, press **APPL**. Select **Layout....**

CONFIG > THEO > PROG > DATA	
As Built	
Pt:	PT0009
Line:	----- m
Offs:	----- m
H :	----- m
<div>APPL</div> <div>H & R</div> <div>SETUP</div>	

CONFIG > THEO > PROG > DATA	
Layout...	
As Built...	
Angle & Distance...	
Tie Distance...	
Area...	
<div>P-LIST</div> <div>OK</div> <div>MORE</div>	

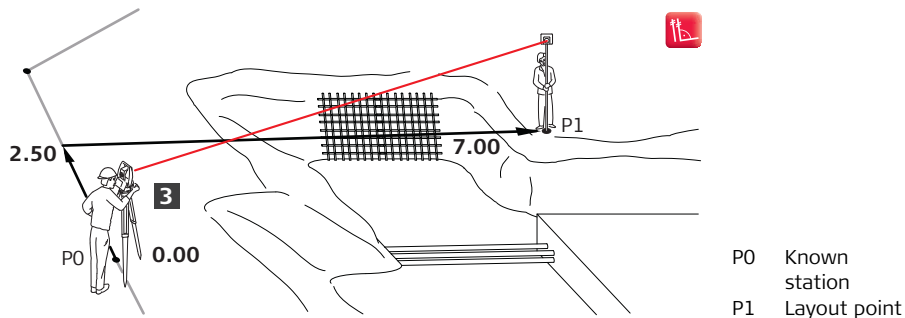
2 Enter ID of point to layout (**Pt**). Turn Builder in the shown direction. Measure until results are within the correct deviation.

CONFIG > THEO > PROG > DATA	
Layout	
Pt:	2012(↑)
Line:	13.800 m ↑ 20.68 m
Offs:	15.400 m → 053.4850 g
H :	0.000 m ↑ ----- m
<div>APPL</div> <div>MEASURE</div> <div>SETUP</div>	

CONFIG > THEO > PROG > DATA	
Layout	
Pt:	2012(↑)
Line:	13.800 m ↑ 10.68 m
Offs:	15.400 m → 0.000 m
H :	0.000 m ↑ 0.100 m
<div>APPL</div> <div>MEASURE</div> <div>SETUP</div>	

CONFIG > THEO > PROG > DATA	
Layout	
Pt:	2012(↑)
Line:	13.800 m ↑ 0.011 m
Offs:	15.400 m → 0.002 m
H :	0.000 m ↑ 0.100 m
<div>APPL</div> <div>MEASURE</div> <div>SETUP</div>	

4.2 Layout Points from Plan with Line & Offset



This procedure can also be used for all other points you want to layout.

Given:

- Builder is set up with known station. Setup with height is optional.
- Plan with dimensioning.

1 In the **PROG** Tab page, press **APPL**. Select **Layout....**

CONFIG > THEO > PROG > DATA >
As Built
Pt: PT0009
Line: ---- m
Offs: ---- m
H : ---- m
APPL H & R SETUP

CONFIG > THEO > PROG > DATA >
Layout...
As Built...
Angle & Distance...
Tie Distance...
Area & Volumes...
P-LIST OK MORE

2 Use Navigation keys to navigate to **Line**. Enter given value and press **OK**. Repeat this for offset (**Offs**) and height (**H**).

CONFIG > THEO > PROG > DATA >
Layout
Pt: x
Line: 2.500 m
Offs: 100.000 m
H : 5.000 m
DELETE OK

CONFIG > THEO > PROG > DATA >
Layout
Pt: x
Line: 2.500 m
Offs: 7.000 m
H : 5.000 m
DELETE OK

CONFIG > THEO > PROG > DATA >
Layout
Pt: x
Line: 2.500 m
Offs: 7.000 m
H : 0.000 m
DELETE OK

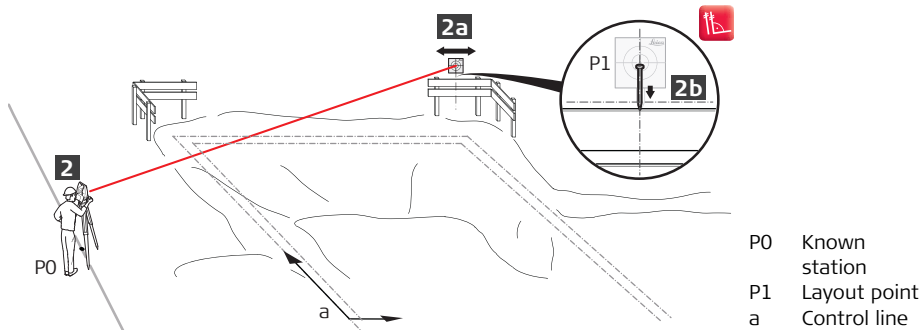
3 Turn Builder in the shown direction. Measure until results are within the correct deviation.

CONFIG		THEO		PROG		DATA	
Layout							
Pt:	----			Turn Builder			
Line:	6.400 m	↓----		---		m	
Offs:	13.700 m	+072.1780 g					
H :	0.000 m	↑----		---		m	
APPL		MEASURE		SETUP			



CONFIG		THEO		PROG		DATA	
Layout							
Pt:	2000					%	
Line:	6.400 m	↓		0.013 m			
Offs:	13.700 m	+		0.019 m			
H :	0.000 m	↓		0.019 m			
APPL		MEASURE		SETUP			

4.3 Layout Nails on Profile Boards from Control Line

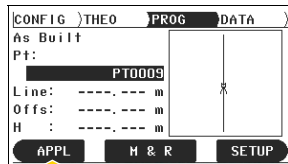


Enable **EDM tracking** and **Laser pointer** while sighting the profile board for a faster workflow. For improved accuracy or for final layout also use a reflector target.

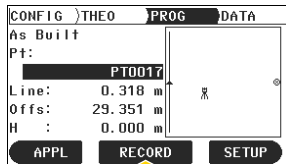
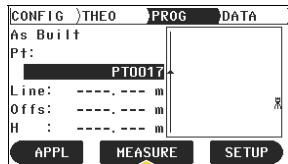
Given:

- Builder is set up with known station. Setup with height is optional.
- Plan with dimensioning.

- 1** In the **PROG** Tab page, press **APPL**. Select **As Built....**



- 2** Sight target on profile board and press **MEASURE**. Verify offset value (**Offs**). Note that this value is an absolute value to the control line. Move target to designated offset dimension [2a]. Measure target again until results are within the correct deviation and mark the point on the profile board [2b]. Press **RECORD** to store the point.

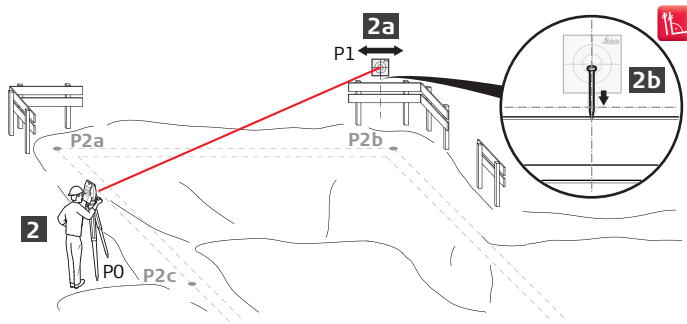


If there are vertical lines to layout, verify **Line** value.



For faster workflow use measurement mode **Measure**. To store the point, switch to **All in 1** or **Measure/Record** by pressing Switch key 2.

4.4 Layout Nails on Profile Boards from Coordinates



P0 Known station
P1 Layout point
P2a.. Coordinate point

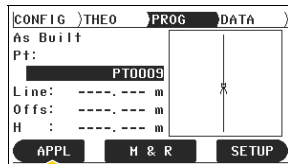


Enable **EDM tracking** and **Laser pointer** while sighting the profile board for a faster workflow. For improved accuracy or for final layout also use a reflector target.

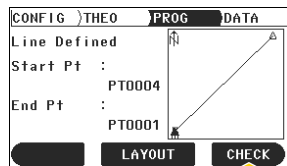
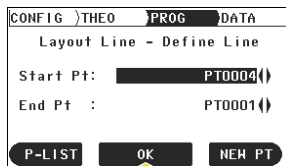
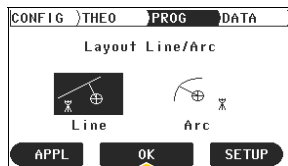
Given:

- Builder is set up with known station. Setup with height is optional.
- List with layout points and coordinates have been stored in Builder's memory.

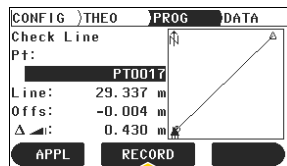
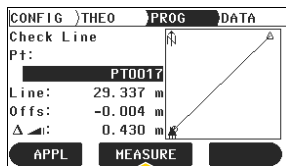
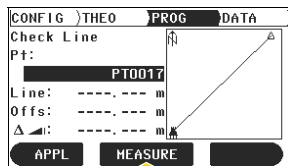
1 In the **PROG** Tab page, press **APPL**. Select **Layout Line/Arc/Spiral....** and **Basic....**



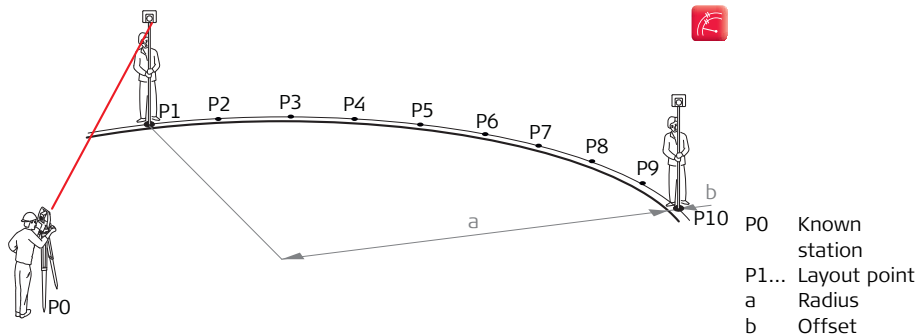
2 Select **Line**. Enter ID of start point (**Start Pt**) and of end point (**End Pt**) and press **OK**. Then press **Check**.



- 3** Sight target on profile board and press **MEASURE**. Verify line (**Line**) and offset (**offs**) values. Note that these values are absolute values to the control line. Move target along board until offset value is **0.000** [2a]. Measure and record target to verify results. Mark the point on the profile board [2b].



4.5 Layout Pins with Offset for Rounded Curbs



This procedure can also be used, for example, for building up any round formworks.

Given:

- Builder is set up with known station. Setup with height is optional.
- Constructional drawing with dimensioning. The points have been stored in Builder's memory.

1 In the **PROG** Tab page, press **APPL**. Select **Layout Line/Arc/Spiral....** and **Basic....**

CONFIG > THEO > PROG > DATA

As Built

Pt: PT0009

Line: ---.--- m

Offs: ---.--- m

H : ---.--- m

APPL H & R SETUP

CONFIG > THEO > PROG > DATA

Hidden Point...

COGO...

Layout Line/Arc/Spiral...

Measure & Descriptor...

P-LIST OK BACK

CONFIG > THEO > PROG > DATA

Layout

Basic...

Advanced...

APPL OK SETUP

2 Select **Arc**. Select the method of how to define the arc, for example **Start Point&End Point&Radius**, enter or change the other values and press **OK**.

CONFIG > THEO > PROG > DATA

Layout Line/Arc

Line Arc

APPL OK SETUP

CONFIG > THEO > PROG > DATA

Layout Arc - Define Arc

Method : StPt&EdPt&Radius

Start Pt : 1280

End Pt : 1281

Radius : 1.000 m

Arc-Turn : Clockwise

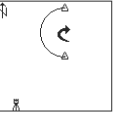
P-LIST OK NEW PT

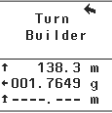


Refer to the Builder Series User Manual for more details about the different methods.

3

Press **LAYOUT**. Enter values for chainage of the arc (**Arc**) and Offset (**Offs**) and begin with layouting.

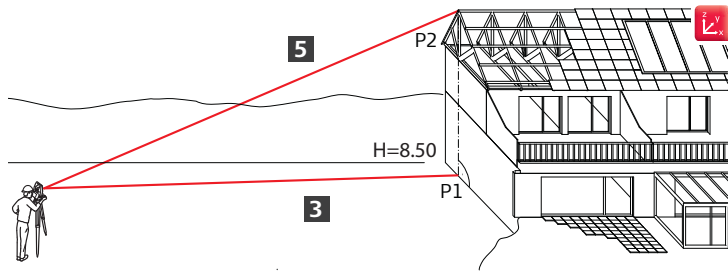
CONFIG	THEO	PROG	DATA
Arc Defined			
StPt&EdPt&Radius			
2001			
2002			
Radius:			
50.000 m			
			
LAYOUT		CHECK	

CONFIG	THEO	PROG	DATA
Layout Arc			
Arc : 5.000 m			
Offs: 0.200 m			
			
APPL		MEASURE	

5 How to Measure Heights



5.1 Measure the Height of Inaccessible Points



P1 Lower point
P2 Upper point



This procedure can be used to measure, for example, the height of buildings, power lines, cranes, overhead clearances and trees.

Given:

- Builder is set up with height, known station is not necessary.
- Lower point and upper point are nearly in a vertical line.
- Target is measurable reflectorless.

1 In the **PROG** Tab page, press **SETUP**. Select **Height...**

CONFIG > THEO > PROG > DATA

As Built

Pt: PT0009

Line: ----- m

Offs: ----- m

H : ----- m

APPL H & R SETUP

CONFIG > THEO > PROG > DATA

Control Line...

Coordinates...

Height...

OK

2 Enter **0.000 m** for both instrument height (**hi**) and reflector height (**hr**) and press **HTRANS** for height transfer. Press **NEW PT**. Enter a point ID (**Pt**) and press **OK**.

CONFIG > THEO > PROG > DATA

ESTABLISH HEIGHT

Station H: 421.000 m

hi : 0.000 m

hr : 0.000 m

OK HTRANS

CONFIG > THEO > PROG > DATA

Select Height Point

Pt : 1100

E : 999.999 m

N : 1086.831 m

H : 118.833 m

P-LIST OK NEW PT

CONFIG > THEO > PROG > DATA

Enter Point Coordinates

Pt : 1000

E : ----- m

N : ----- m

H : ----- m

ENH=0 OK

- 3** Press **ENH=0** to set coordinates to 0.000 then press **OK** to store the point. Sight lower point and press **M & R**. Confirm new Station Height with **YES**.

CONFIG	THEO	PROG	DATA
Enter Point Coordinates			
Pt :	1000		
E :	0.000	m	
N :	0.000	m	
H :	0.000	m	
<div> <div>ENH=0</div> <div>OK</div> </div>			

1.

2.

CONFIG	THEO	PROG	DATA
Measure Height Point			
PtId:	1000		
H _z :	40.000	g	
▲:	----- m		
<div> <div></div> <div>H & R</div> <div></div> </div>			

CONFIG	THEO	PROG	DATA
New Station Height			
1.564 m			
will be set			
<div> <div>NO</div> <div>NEXT PT</div> <div>YES</div> </div>			

- 4** Press **APPL**. Select **Angle & Distance...**

CONFIG	THEO	PROG	DATA
Layout			
Pt:	2000	%	
Line:	6.400 m	↓	0.013 m
Offs:	13.700 m	+	0.019 m
H :	0.000 m	↓	0.019 m
<div> <div>APPL</div> <div>MEASURE</div> <div>SETUP</div> </div>			

CONFIG	THEO	PROG	DATA
Layout...			
As Built...			
Angle & Distance...			
Tie Distance...			
Area & Volumes...			
<div> <div>P-LIST</div> <div>OK</div> <div>MORE</div> </div>			

5

Press **MEASURE** to measure the point again. **H** should still be **0.000**. If this is not the case, restart from step 1.

Sight upper point. Now, **H** shows the height of the upper point.

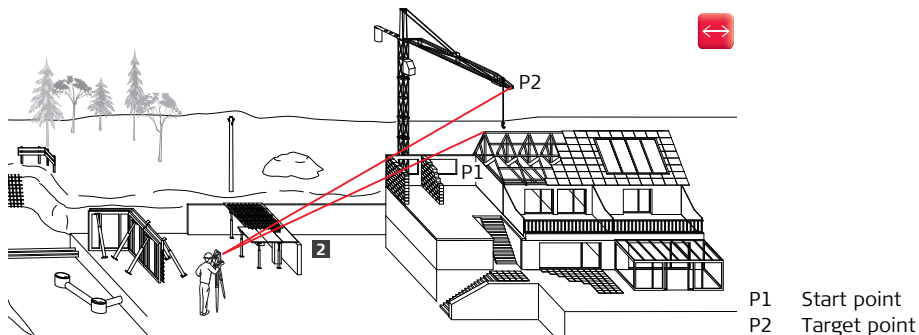
CONFIG	THEO	PROG	DATA
Angle & Distance			
Pt:			
1002			
Hz:	40.000	g	
▴:	-----	m	
H :	-----	m	
APPL MEASURE SETUP			



CONFIG	THEO	PROG	DATA
Angle & Distance			
Pt:			
1002			
Hz:	40.000	g	
▴:	9.877	m	
H :	0.000	m	
APPL RECORD SETUP			

CONFIG	THEO	PROG	DATA
Angle & Distance			
Pt:			
1002			
Hz:	40.000	g	
▴:	9.877	m	
H :	3.129	m	
APPL RECORD SETUP			

5.2 Measure the Height Difference between Two Inaccessible Points



This procedure can be used to measure, for example, the height of buildings, power lines, cranes, ridges, overhead clearances and trees.

Given:

- Builder is set up with height, known station is not necessary.
- Target is measurable reflectorless.

1

In the **PROG** Tab page, press **APPL**. Select **Tie Distance...** Select the method most suitable to your workflow.

CONFIG > THEO > PROG > DATA

As Built

Pt: **PT0009**

Line: ----- m

Offs: ----- m

H : ----- m

APPL M & R SETUP

CONFIG > THEO > PROG > DATA

Layout...

As Built...

Angle & Distance...

Tie Distance...

Area...

P-LIST OK MORE

CONFIG > THEO > PROG > DATA

Tie Distance - Select method

Radial Polygonal

APPL OK SETUP



Radial always shows the height difference to the first measured point while **Polygonal** always shows the height difference to the last measured point.

2

Sight start point and press **M & R**. Sight target point and press **M & R**. Δ shows the height difference between the points.

CONFIG > THEO > PROG > DATA

Tie Distance - First Point

From: **PT003**

Hz : 84.060 g

Δ : ----- m

APPL M & R SETUP

CONFIG > THEO > PROG > DATA

Tie Distance - Next Point

From: **PT003**

To : **PT004**

Hz : 120.324 g

Δ : ----- m

APPL M & R SETUP

CONFIG > THEO > PROG > DATA

Tie Distance - Result

From: **PT003**

To : **PT004**

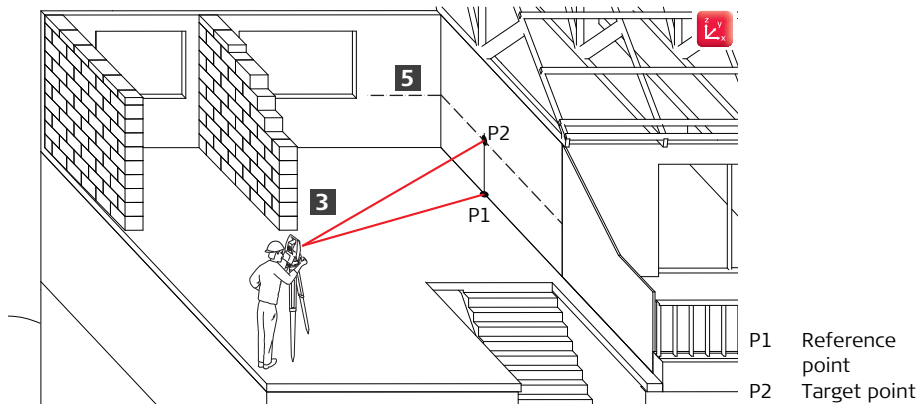
Δ : 12.771 m

Δ : -0.314 m

Grade : -2.5 %

OK

5.3 Place a Datum Line



You can also use elevations above sea level for this procedure.

Given:

- Builder is levelled.
- Target is measurable reflectorless.

- 1** In the **PROG** Tab page, press **SETUP**. Select **Height...**. Enter **0.000 m** for both instrument height (**hi**) and reflector height (**hr**) and press **HTRANS** for height transfer.

CONFIG > THEO > PROG > DATA >

As Built

Pt:

Line: ----- m

Offs: ----- m

H : ----- m

APPL M & R **SETUP**

CONFIG > THEO > PROG > DATA >

Control Line...

Coordinates...

Height...

OK

CONFIG > THEO > PROG > DATA >

ESTABLISH HEIGHT

Station H: 421.000 m

hi : 0.000 m

hr :

OK HTRANS

- 2** Press **NEW PT** to enter a new point. Enter a Point ID (**Pt**) and press **OK**. Press **ENH=0** to set coordinates to **0.000**. Press **OK** to store the point.

CONFIG > THEO > PROG > DATA >

Select Height Point

Pt :

E : 999.999 m

N : 1086.831 m

H : 118.833 m

P-LIST **OK NEW PT**

CONFIG > THEO > PROG > DATA >

Enter Point Coordinates

Pt :

E : ----- m

N : ----- m

H : ----- m

ENH=0 **OK**

CONFIG > THEO > PROG > DATA >

Enter Point Coordinates

Pt :

E : 0.000 m

N : 0.000 m

H : 0.000 m

ENH=0 **OK**

1. 2.

- 3** Sight a point at the bottom of the wall or a point of a reference height and press **M & R**. New Station Height shows the height difference between point and telescope height. Confirm new Station Height with **YES**.

CONFIG > THEO > PROG > DATA >	
Measure Height Point	
PtId:	1000
Hz:	40.000 g
▲:	----- m
<div> <div></div> <div>M & R</div> <div></div> </div>	

CONFIG > THEO > PROG > DATA >	
New Station Height	
1.564 m	
will be set	
<div> <div>NO</div> <div>NEXT PT</div> <div>YES</div> </div>	


- 4** Press **APPL**. Select **Angle & Distance...**. Measure point again.

CONFIG > THEO > PROG > DATA >	
Layout	
Pt:	2000(↓)
Line:	6.400 m
Offs:	13.700 m
H :	0.000 m
<div> <div>APPL</div> <div>MEASURE</div> <div>SETUP</div> </div>	

CONFIG > THEO > PROG > DATA >	
Layout...	
As Built...	
Angle & Distance...	
Tie Distance...	
Area & Volumes...	
<div> <div>P-LIST</div> <div>OK</div> <div>MORE</div> </div>	

CONFIG > THEO > PROG > DATA >	
Angle & Distance	
Pt:	1002
Hz:	40.000 g
▲:	----- m
H :	----- m
<div> <div>APPL</div> <div>M & R</div> <div>SETUP</div> </div>	

5

Press  to open the EDM Settings. Select **On** for both **Laser Pointer** and **Tracking** and press **OK**. Sight wall for the datum line. Move telescope vertically until **H** shows correct value. Make mark at red dot on wall.

EDM Settings

EDM Type : red dot

Laser Pointer : On

Tracking : On

hr : 0.000 m

OK

CONFIG THEO PROG DATA

Angle & Distance

Pt: 1008

Hz: 40.000 g

20.000 m

H: 0.000 m

APPL H & R SETUP

CONFIG THEO PROG DATA

Angle & Distance

Pt: 1008

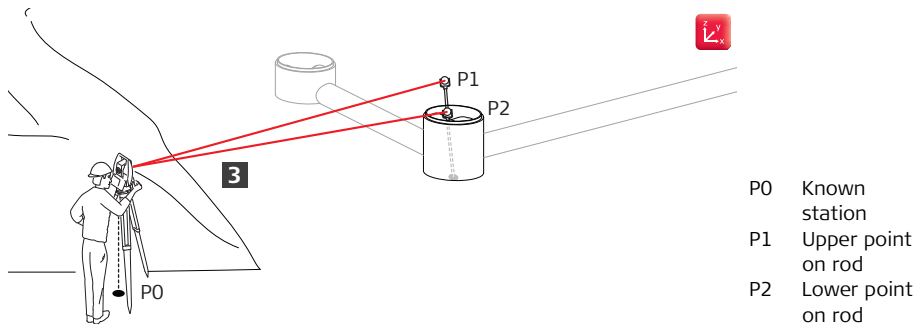
Hz: 40.000 g

19.970 m

H: 1.000 m

APPL H & R SETUP

5.4 Determine the Height of the Bottom of a Manhole



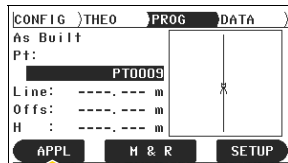
This procedure can be used for every point which cannot be measured directly, for example points behind corners and trees, in chambers and in building pits.

Given:

- Builder is set up with known station and height.
- Rod, folding rod or level staff.

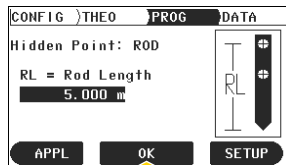
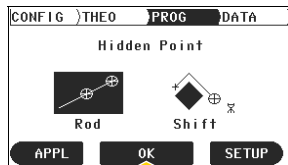
1

In the **PROG** Tab page, press **APPL**. Select **Hidden Point...**



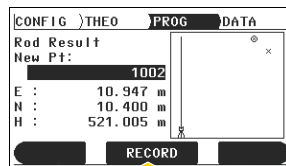
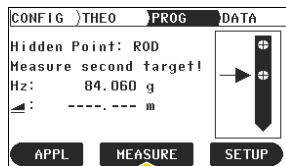
2

Select **Rod** and press **OK**. Enter the Rod's length and press **OK**.



3

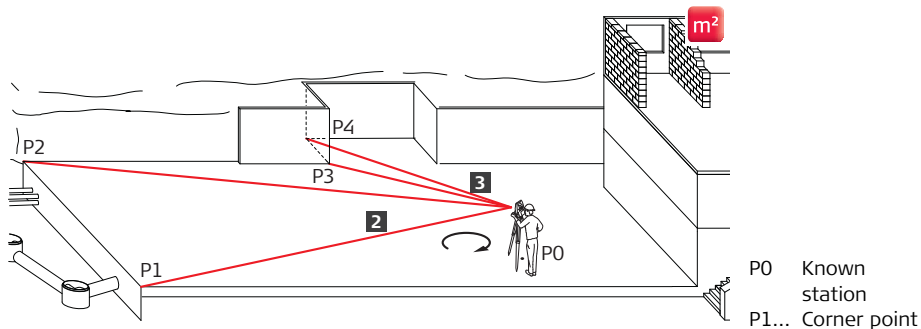
Sight upper point on rod and press **MEASURE**. Sight lower point and press **MEASURE**. **H** shows the height of the bottom of the manhole. Press **RECORD** to store the point.



6 How to Measure Areas & Volumes



6.1 Measure and Calculate a Plane Area

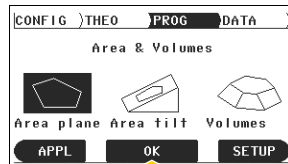
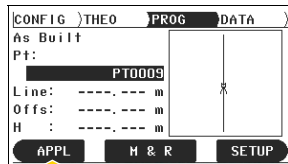
**Given:**

Builder is set up anywhere.

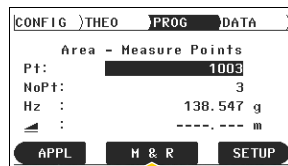
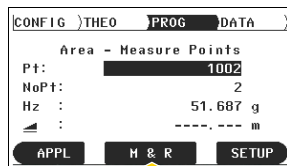
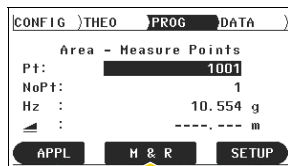


To use the measurement afterwards, Builder must be set up with known station and height.

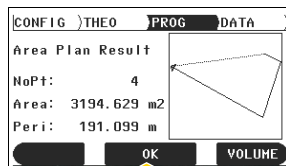
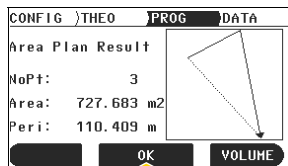
1 In the **PROG** Tab page, press **APPL**. Select **Area & Volumes....** and **Area plane**.



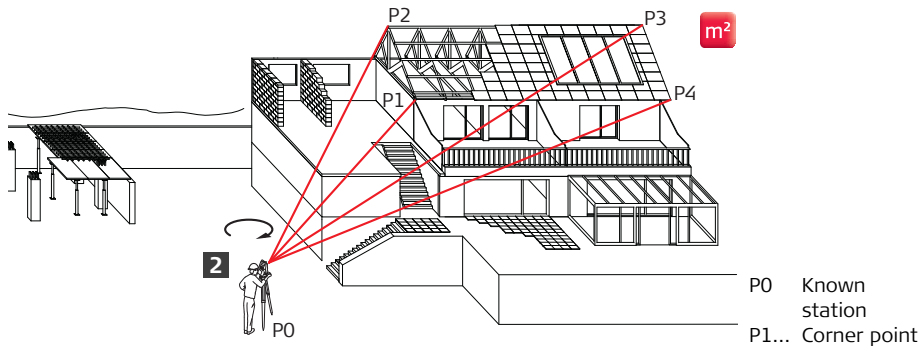
2 Sight, measure and store the corner points either in clockwise or counter-clockwise direction.



- 3** After the third point has been measured and stored, a result screen will pop up with an overview about the measured points, the covered area and perimeters. To add more points, press **OK** and sight, measure and store as many points as needed. To leave the application, press **ESC**.



6.2 Measure and Calculate a Tilted Area

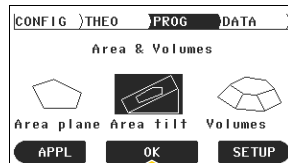
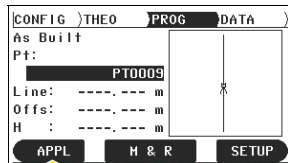
**Given:**

Builder is set up anywhere.

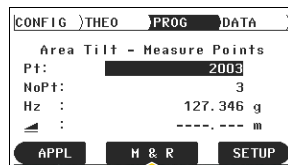
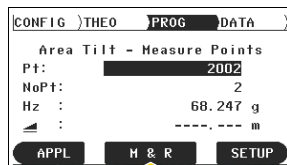
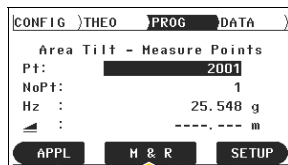


To use the measurement afterwards, Builder must be set up with known station and height.

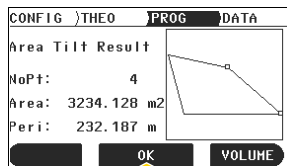
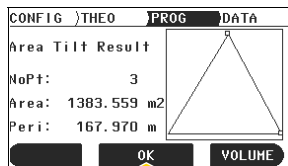
1 In the **PROG** Tab page, press **APPL**. Select **Area & Volumes....** and **Area tilt**.



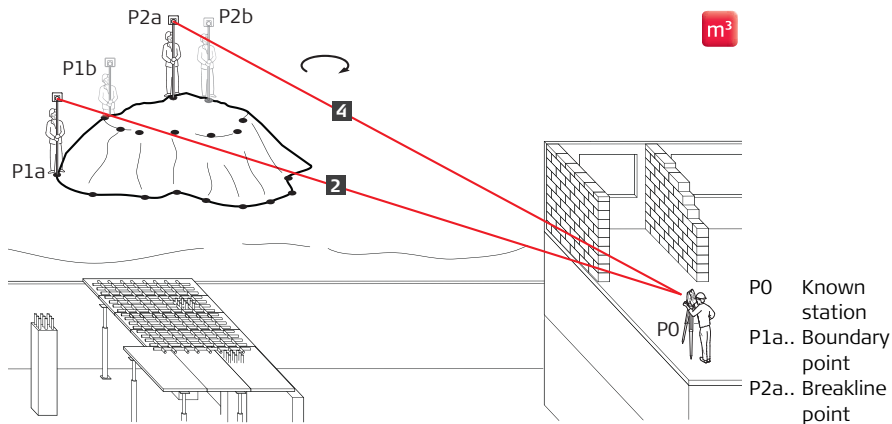
2 Sight, measure and store the corner points either in clockwise or counter-clockwise direction.



- 3** After the third point has been measured and stored, a result screen will pop up with an overview about the measured points, the covered area and perimeters. To add more points, press **OK** and sight, measure and store as many points as needed. To leave the application, press **ESC**.



6.3 Measure and Calculate Volumes



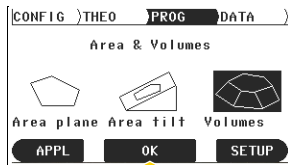
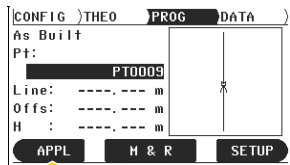
Given:

Builder is set up anywhere.

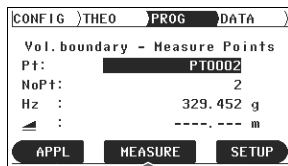
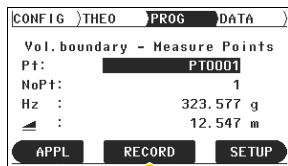
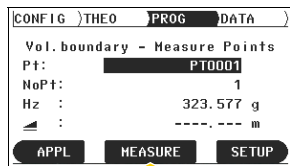


To use the measurement afterwards, Builder must be set up with known station and height.

1 In the **PROG** Tab page, press **APPL**. Select **Area & Volumes....** and **Volumes**.

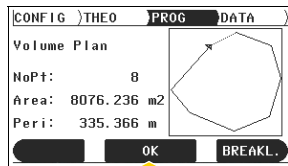


2 Sight first point of boundary and press **MEASURE**. Press **RECORD** to store the point. Proceed in the same way for the second point and the third point.

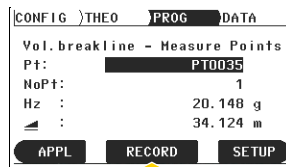
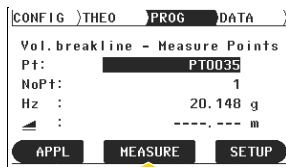
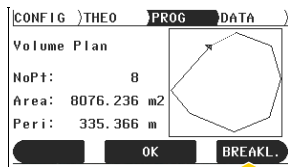


All points need to be measured consistently either in clockwise or in counter-clockwise direction.

- 3** After the third point has been measured and stored, a result screen will pop up with an overview about the measured points, the covered area and perimeters. To add more points of the boundary, press **OK** and sight, measure and store as many points as needed.

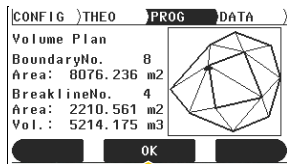
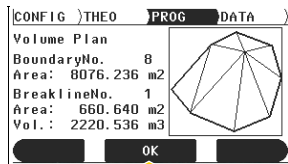


- 4** After measuring all points of the boundary, the points of the breakline have to be measured. Press **BREAKL.** Sight, measure and store points of the breakline in the same way as points of the boundary.



5

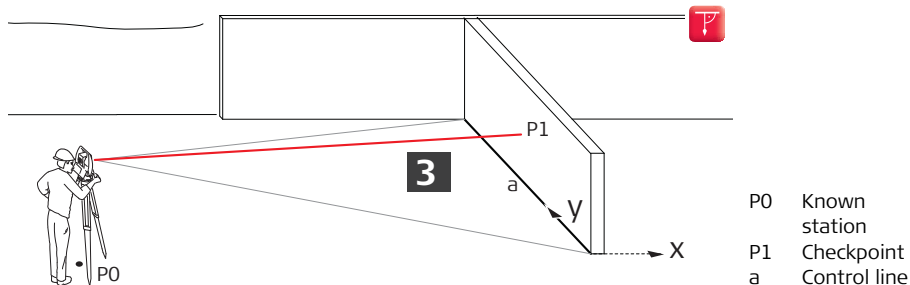
After the first point of the breakline has been measured and stored, a result screen will pop up with additional volume information. To add more points of the breakline, press **OK** and sight, measure and store as many points as needed. To leave the application, press **ESC**.



7 How to Check Verticality



7.1 Check the Verticality of a Wall

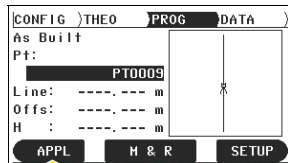



This procedure can also be used to build up and check the verticality of formworks.

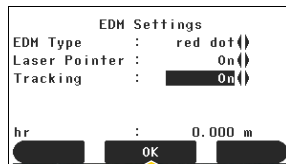
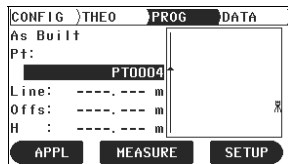
Given:

- Builder is set up as described in chapter "1.1 Set Up Anywhere Based on Given Control Line" centrally in front of the wall using the lower left and lower right corner of the wall as the two points of control line.

1 In the **PROG** Tab page, press **APPL**. Select **As built....**



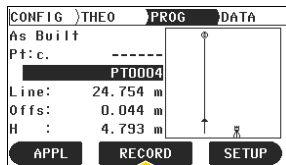
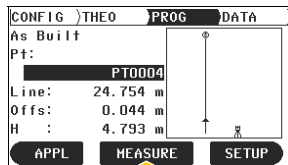
2 Enter ID of start point (**Pt**). Press  to open the EDM Settings. For **EDM Type** select **red dot** and for **Tracking** select **On** and press **OK**. Builder will automatically switch back to application As Built.



3

Press **MEASURE** and start moving the telescope up and down. Builder will constantly measure the distance and update line and offset values without storing points. Check **Offs** to monitor the wall's deviation from verticality.

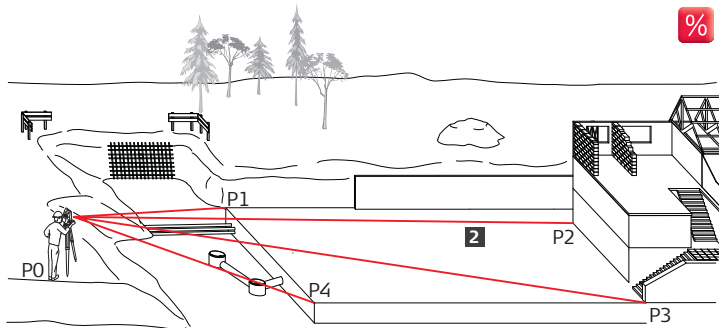
To store the last measured point, press **RECORD**. To stop EDM Tracking, press **ESC**.



8 How to Check Plane or Tilted Surfaces



8.1 Check a Plane Surface

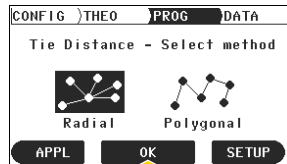
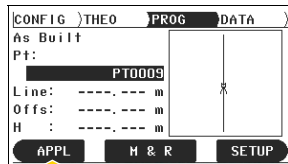



P0 Setup point
P1... Checkpoint

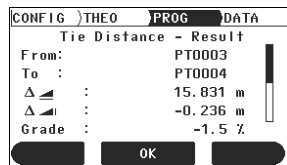
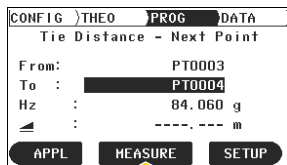
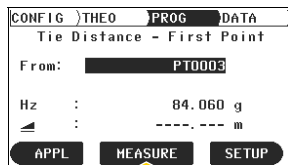
Given:

Builder is set up anywhere.

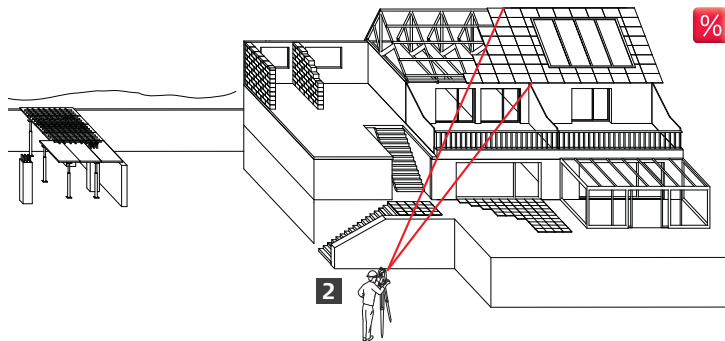
1 In the **PROG** Tab page, press **APPL**. Select **Tie Distance...** and **Radial**.



2 Sight start point and press **MEASURE**. Sight target point and press **MEASURE**. The result screen shows the deviations for height (Δ ) and **Grade**. For a plane surface both values should show **0**.



8.2 Check a Tilted Surface



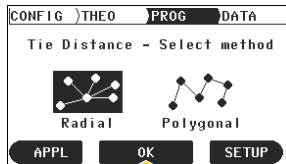
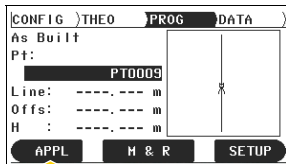
P0 Setup point
P1 Checkpoint

Given:

Builder is set up anywhere.

1

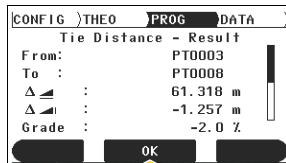
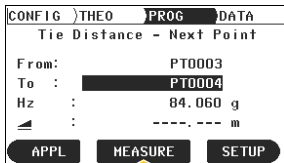
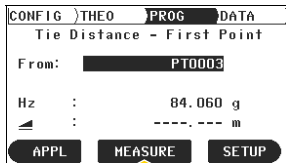
In the **PROG** Tab page, press the **APPL** button. Select **Tie Distance...**. Select the method most suitable to your workflow.



Radial always shows the height difference to the first measured point while **Polygonal** always shows the height difference to the last measured point.

2

Sight start point and press **MEASURE**. Sight target point and press **MEASURE**. The result screen shows the deviations for height (Δ ) and **Grade**.



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- when it has to be **right**

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